Bothell Landing
Draft Cleanup Action Plan
Revision No. 1

Prepared for

City of Bothell
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Bothell, WA 98011

Prepared by

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CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

Prepared by Blaine Hardy, P.E.

Checked by David Dinkuhn, P.E.

Approved by Steve Fuller, L.G.

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ACRONYMS AND ABBREVIATIONS

ARAR	applicable relevant and appropriate requirement
bgs	below the existing ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CAP	Cleanup Action Plan
CFR	Code of Federal Regulations
City	City of Bothell
COPC	contaminant of potential concern
cy	cubic yards
DCA	dichloroethane
DCE	dichloroethene
Ecology	Washington State Department of Ecology
HVOC	halogenated volatile organic compound
MNA	monitored natural attenuation
MTCA	Model Toxics Control Act
ORC™	oxygen release compound
PCE	tetrachloroethylene
RAO	remedial action objective
RI/FS	remedial investigation/feasibility study
Site	Bothell Landing property
SR	State Route
SVOC	semi-volatile organic compound
TCE	trichloroethylene
UST	underground storage tank
VC	vinyl chloride
WAC	Washington Administrative Code

1. INTRODUCTION

This Draft Cleanup Action Plan (CAP) has been prepared for the Bothell Landing site (Site) located in Bothell, Washington (Figure 1-1). The CAP is being conducted under Agreed Order DE 6294, dated February 3, 2009, between the City of Bothell (City) and the Washington State Department of Ecology (Ecology). Requirements under the Agreed Order include performance of a Remedial Investigation/ Feasibility Study (RI/FS) and development of a CAP to address soil and groundwater contamination related to historical releases of hazardous substances at the Site.

The City currently owns the Site, a portion of which will accommodate the realignment of State Route (SR) 522, which is scheduled for construction in summer 2010. Cleanup actions will be implemented as part of the new road construction. Remnant portions of the property will be redeveloped as part of the City's overall Downtown Revitalization Plan. In general, cleanup approaches discussed in this document will address anticipated future property uses as envisioned in the Downtown Revitalization Plan. Figure 1.1 from the Bothell Downtown Subarea Plan is provided in Appendix A for reference. The figure shows proposed future land uses in the vicinity of the Site.

1.1 PURPOSE

This CAP was completed per the Agreed Order and Washington Administrative Code (WAC) 173-340-380, Model Toxics Control Act (MTCA) [Ecology 2007]. The purpose of the CAP was to present a general conceptual-level description of the preferred cleanup actions developed under the RI/FS (Parametrix 2009). The CAP was developed using information obtained during Site investigations that began in 2007 and are ongoing. MTCA requires a CAP to include:

- Applicable state and federal laws for the cleanup action.
- Cleanup standards for each hazardous substance and for each medium of concern.
- A brief summary of the other cleanup alternatives evaluated in the RI/FS.
- A description of the proposed cleanup action and a summary of the rationale used for selecting the proposed alternative.
- A description of the required institutional controls, the types and concentration of contaminants left on site, and measures that will be used to prevent contact with these substances.
- A schedule for implementation of the cleanup action.

2. SITE CONDITIONS

This section summarizes the Site history and the human health and environmental concerns.

2.1 SITE HISTORY

The approximately 2.8-acre Site is located at 18120, 18126, and 18132 Bothell Way, and 10001 Woodinville Drive, Bothell, Washington (Tax Parcels Nos. 9457200015 and 9457200020). The property currently contains two single-story restaurants in the northeast and northwest corners of the property and two multi-tenant retail and office buildings in the southern portion of the Site. The remainder of the Site is covered with asphalt-paved parking and landscaping (Figure 2-1).

Two service stations were reportedly located on the northeastern quadrant of the Site from the 1930s to the 1970s along with mixed commercial activity (ECOSS 2008; HWA 2007). The stations were demolished during site reconstruction in the 1970s. The underground storage tanks (USTs) associated with the stations were removed during the 1970s reconstruction (HWA 2007) and in 1998 when the City purchased the north-central portion of the Site at 10001 Woodinville Way as part of a roadway widening and Rotunda Park project. Various Site soil and groundwater investigations have taken place since 1998. For a more detailed discussion of the Site history, physical characteristics, and previous investigations please see the RI/FS (Parametrix 2009).

2.2 HUMAN HEALTH AND ENVIRONMENTAL CONCERNS

The following sections include a discussion of the nature and extent of Site contamination to be addressed by the proposed cleanup action, a summary of the Site contaminants of potential concern (COPCs), and an assessment of risk.

2.2.1 Soil

This section summarizes the nature and extent of soil contaminated with COPCs that will be addressed by the proposed cleanup action.

2.2.1.1 Petroleum Hydrocarbons (including BTEX)

Petroleum releases in the vicinity of the historical gas stations and USTs have been well documented (Parametrix 2009). The estimated horizontal extent of petroleum-contaminated soil is shown on Figure 2-1. Also shown are the locations of the former gas stations (Riley Group 2007; ECOSS 2008).

The historical and recent sampling results indicate that soils within the contaminated soil footprint contain gasoline; diesel; motor oil; benzene, toluene, ethylbenzene, and total xylenes (BTEX); and semi-volatile organic compounds (SVOCs) including naphthalenes at concentrations above the cleanup levels. Soil samples containing contaminants above the cleanup levels have been collected from depths ranging from 6 to 12 feet below ground surface (bgs). These depths of both observed and measured soil contamination are consistent with a "smear zone" in which soils within the range of annual water table fluctuations are contaminated by floating petroleum.

Monitoring wells have been installed to investigate potential impacts from petroleum migrating from the Hertz Rental Property to the west of the Site. Gasoline-, diesel-, and oil- range petroleum hydrocarbons were detected in the soil samples from the monitoring well borings but at concentrations below the screening criteria. The extent of potential petroleum contamination in soil has not been delineated on the Hertz Rental Property but it appears to be limited.

2.2.1.2 Metals

Limited sampling for metals has been conducted during previous investigations. Historically, some soil samples were analyzed for MTCA metals, which include arsenic, cadmium, chromium, lead, and mercury.

Barium and/or lead were detected above cleanup levels (ecological indicator concentrations) in soil samples collected from borings near the center of the Site at depths of 6 feet bgs each. These borings are located within the footprint of the future SR 522 alignment; therefore, paving to be completed following the cleanup action during the summer of 2010 will eliminate the ecological receptor pathway. An apparent source for the barium and lead has not been identified. No other metals were detected in soil at concentrations above cleanup levels.

2.2.2 Groundwater

This section summarizes the nature and extent of groundwater contaminated with COPCs that will be addressed by the proposed cleanup action.

2.2.2.1 Petroleum Hydrocarbons (including BTEX)

Historical groundwater samples collected from Site wells have primarily been analyzed for petroleum hydrocarbons. One constituent (benzene) was detected above the cleanup levels in a single well (MW-3). This is consistent with the historical data because MW-3 is located within the petroleum-contaminated soil footprint. The approximate area of petroleum-contaminated groundwater as estimated by HWA in 2007 is shown in Figure 2-1. Monitoring wells have been installed to investigate potential impacts from petroleum migrating from the Hertz Rental Property to the west of the Site. Specifically, gasoline- and oil-range petroleum hydrocarbons were detected in groundwater above cleanup levels in soil probe HZ-B7 and non-aqueous phase liquid was observed during groundwater sampling in this boring (HWA 2008).

2.2.2.2 HVOCs

Groundwater contaminated with halogenated volatile organic compounds (HVOCs) from upgradient sources also represents a contaminant source. The contaminant source(s) cannot currently be attributed to a specific location but likely include two known current and former dry cleaning businesses that are located upgradient (north) from the property.

Historical groundwater samples collected from Site wells were analyzed for HVOCs. Historical results indicate that the source(s) of the HVOCs are located in the upgradient direction. In addition to the on-site wells, three upgradient wells have been sampled. tetrachloroethylene (PCE), trichloroethylene (TCE), 1,2-dichloroethane (1,2-DCA), vinyl chloride (VC), 1,1-dichloroethene (1,1-DCE), and cis-1,2-dichloroethene (1,2-DCE) were detected in several wells. Only VC was detected at a concentration exceeding cleanup levels in an on-site well (MW-3). The upgradient wells contained both PCE and VC at concentrations exceeding cleanup levels.

Concentrations of HVOCs in groundwater appear to be more extensive to the north and east with the highest concentration of PCE observed approximately 100 feet northeast of the Site. Generally, concentrations of PCE decrease towards the south.

Groundwater samples have been collected from differing depths within site wells to assess for vertical concentration gradients. Although only 1,2-DCA, cis-1,2-DCE, and chloroform were detected in the samples, a trend of increasing concentration with depth exists.

2.2.3 Summary of Contaminants of Potential Concern

Based on the RI/FS (Parametrix 2009), the COPCs for soil include:

- Total petroleum hydrocarbons (gasoline-, diesel-, and lube oil-range)
- Aromatic hydrocarbons (BTEX)
- SVOCs (including naphthalenes)
- Metals (barium and lead).

For groundwater, COPCs include:

- Total petroleum hydrocarbons
- Aromatic hydrocarbons
- HVOCs.

Regarding HVOCs: Per WAC 173-340-360(4)(d), "When area background concentrations would result in recontamination of the site to levels that exceed cleanup levels, that portion of the cleanup action which addresses cleanup below area background concentrations may be delayed until the off-site sources of hazardous substances are controlled." WAC 173-340-200 defines area background as the concentrations of hazardous substances that are consistently present in the environment in the vicinity of a site which are the result of human activities unrelated to releases from that site. Although there are HVOC concentrations in groundwater at the Site, they are similar to area background (upgradient) concentrations and not associated with releases at the Site. Therefore, cleanup of the HVOCs in groundwater are not addressed by this CAP.

2.2.4 Assessment of Risk

Potential exposure pathways developed under the RI/FS (Parametrix 2009) for the COPCs include the following:

- Current/future indoor retail worker:
  - Inhalation of vapors from the subsurface (groundwater and soil) in indoor air
  - Incidental soil ingestion and dermal contact
  - Direct ingestion of contaminated groundwater used as drinking water
- Current/future construction/utility worker:
  - Incidental soil ingestion and dermal contact
  - Inhalation of vapors from the subsurface soil in outdoor air
  - Inhalation of vapors from or dermal contact with groundwater in a trench or excavation
- Current/future resident or Site visitor (adult and child):
  - Inhalation of vapors from the subsurface (groundwater and soil) in indoor air
  - Incidental soil ingestion and dermal contact
  - Direct ingestion of contaminated groundwater used as drinking water

- Ecological receptors
  - Incidental soil ingestion and dermal contact
  - Inhalation of vapors from the subsurface soil in outdoor air or in a burrow
  - Inhalation of vapors from or dermal contact with groundwater in a burrow.

Exposure to contaminants could occur via the complete exposure pathways described above. Based on the nature of the Site and the extent of contamination, current risks appear limited. The likely greatest potential risk to human receptors is inhalation of contaminant vapors in the workplace. Note, however, that only one of the occupied buildings on the Site is underlain (partially) by contaminated soil and groundwater with the potential to cause vapor intrusion. The second most likely exposure risk is to construction workers during soil-disturbing activities. Ecological receptors have limited risk of exposure because the majority of the Site contains buildings or pavement. However, this risk increases under the future development scenario under which approximately the southern third of the Site may become park space (see Figure 1.1 in Appendix A).

3. APPLICABLE STATE AND FEDERAL LAWS

This section discusses the applicable state and federal laws for the Site including applicable or relevant and appropriate requirements (ARARs), cleanup standards, and remedial action objectives.

3.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Cleanup actions under MTCA (WAC 173-340-710) require the identification of all ARARs. Potential ARARs were identified for each medium of concern in the RI/FS (Parametrix 2009). The applicable state and federal laws specific to the selected cleanup action are shown in Table 3-1.

3.2 CLEANUP STANDARDS

Based on the COPCs developed within the RI/FS, a list of specific hazardous substances and their associated cleanup levels was developed. Applicable cleanup levels for the Site were selected from WAC 173-340-720 through 173-340-760. A conservative approach was used to select standards that were most protective of human health and the environment for soil and groundwater. Selected standards used to evaluate media are listed below.

The following cleanup standards were selected for soil:

- MTCA Method A Soil Cleanup Levels for Unrestricted Land Use (WAC 173-340, Table 740-1)
- MTCA Ecological Indicator Soil Concentrations for Protection of Terrestrial Plants and Animals (Table 749-3).

For groundwater, the following cleanup standards were selected:

- MTCA Method A Cleanup Levels for Groundwater (WAC 173-340, Table 720-1).

Table 3-2 shows the cleanup levels of the specific COPCs determined under the RI/FS (Parametrix 2009) for the Site for each hazardous substance of concern and each medium of concern. For evaluation of nature and extent of contamination in order to determine the best cleanup action, the historical and current soil and groundwater analytical data were compared to the cleanup levels in Table 3-2. The values listed for each hazardous substance are the cleanup levels relevant to the Site. Where N/A is listed, regulatory values typically exists; however, those values are not applicable to the Site.

3.3 REMEDIAL ACTION OBJECTIVES

The following remedial action objectives (RAOs) have been established for remediation alternatives:

- Achieve MTCA Method A soil and groundwater cleanup levels at the point of compliance, thus reducing or eliminating human exposure through direct contact and inhalation of vapors.
- Reduce or eliminate risks to ecological receptors from contaminated soil and/or groundwater.
- Use permanent solutions to the maximum extent practicable (which includes consideration of cost-effectiveness).
- Verify the petroleum hydrocarbon-contaminated groundwater plume is stable or shrinking due to attenuation.
- Properly manage contaminated groundwater that may be generated during site development activities, and ensure that activities at the Site do not result in exposure to the contaminated groundwater that has migrated onto the Site

4. REMEDIAL ALTERNATIVES SUMMARY

In this section, remedial alternatives developed under the RI/FS (Parametrix 2009) in accordance with MTCA requirements and guidelines are summarized.

4.1 REMEDIAL ALTERNATIVE DEVELOPMENT

Three remedial alternatives to remediate petroleum-contaminated soil and groundwater were developed that meet the RAOs and MTCA requirements. Each alternative is summarized below.

4.1.1 Alternative 1 - Monitored Natural Attenuation

A monitored natural attenuation (MNA) alternative was developed to represent a cleanup approach involving a minimal level of effort and minimal (lower bound) costs. MNA corresponds to a No Action alternative and consists of monitoring the Site groundwater plume over a long-term period (a monitoring period of 10 years was selected) to ascertain that natural attenuation is occurring. This alternative includes placement of a physical barrier over the Site's contaminated soils as part of new road construction and future redevelopment under the Downtown Bothell Subarea Plan. This alternative includes the implementation of institutional controls on the affected properties (such as deed restrictions) to ensure that current and future property owners are notified of the presence of the contamination and aware that precautions to avoid exposure are necessary. The capital costs for Alternative 1 total $25,000 and the operations and maintenance costs total $190,000 for a total alternative cost of $215,000.

4.1.2 Alternative 2 - In Situ Chemical Oxidation

An alternative based on in situ chemical oxidation was developed to represent an aggressive and innovative cleanup approach with a relatively high level of effort and upper bound costs.

Alternative 2 would be implemented as an in situ remedial technology for the Site prior to the construction of the realignment of SR 522. RegenOx™ by Regenesis is the product used as the basis for Alternative 2. A bench-scale treatability test would be conducted to help refine the full-scale treatment approach for Alternative 2. Alternative 2 would consist of mixing the RegenOx™ with the contaminated soil to a depth of 10 feet bgs using specialized soil mixing equipment. The area of contaminated soil to be treated is approximately 10,400 square feet. Confirmation soil samples would be collected concurrent with the mixing.

Residual groundwater contamination would be treated using in situ enhanced bioremediation. The specific in situ enhanced bioremediation technology selected for the Site involves mixing oxygen release compound (ORC™) with the soil at the same time as the RegenOx™ .

Groundwater monitoring would be conducted quarterly for 1 year after the cleanup to assess groundwater conditions and verify that the contaminated groundwater plume is not expanding. This alternative includes the implementation of institutional controls on the affected properties in case cleanup levels are not met in soils and to control groundwater exposure risk.

The capital costs for Alternative 2 total $970,000 and the operations and maintenance costs total $58,000 for a total alternative cost of $1,028,000.

4.1.3 Alternative 3 - Excavation and Off-Site Disposal

An alternative consisting of excavation and off-Site disposal was developed to represent a level of effort and costs anticipated to fall somewhere between Alternatives 1 and 2.

Approximately 3,370 cubic yards (cy) or 4,550 tons of contaminated soil would be excavated with heavy equipment. Soil that is confirmed to be contaminated would be trucked to a permitted landfill. Confirmation soil samples would be collected from the sidewalls and bottom of the excavation.

Residual groundwater contamination would be treated using ORC™ that is applied in slurry form with the soils used to backfill the excavation. ORC™ would only be applied to soils below the anticipated seasonal high groundwater elevation.

Groundwater monitoring would be conducted quarterly for 1 year after the cleanup to assess groundwater conditions and verify that the contaminated groundwater plume is not expanding. This alternative includes the implementation of institutional controls on the affected properties in case soil cleanup levels are not met and to control groundwater exposure risk.

The capital costs for Alternative 3 total $831,000 and the operations and maintenance costs total $58,000 for a total alternative cost of $889,000.

4.2 REMEDIAL ALTERNATIVES COMPARISON

The three selected petroleum-contaminated soil and groundwater alternatives were compared in accordance with MTCA regarding the following criteria:

- Meet threshold requirements.
- Use permanent solutions to the maximum extent practicable including consideration for public concerns.
- Provide for a reasonable restoration time frame.
- Consider additional performance criteria.

4.2.1 Threshold Criteria

The alternatives evaluated in the RI/FS (Parametrix 2009) would meet the MTCA threshold requirements as follows:

- Each of the alternatives would be protective of human health and the environment through a combination of physical barriers, institutional controls, contaminant destruction or removal, and compliance monitoring.
- Alternatives 2 and 3 would be in compliance with cleanup standards in that cleanup levels would be met at the points of compliance for soil and groundwater. Alternate 1 would not meet this criterion.
- Each of the alternatives would be designed and implemented to meet the requirements of the ARARs.
- Each of the alternatives would conduct health and safety protection monitoring during implementation to ensure that the safety of workers, surrounding populations, and the environment are protected. Confirmation sampling performed for Alternatives 2 and 3 equate to the performance monitoring requirement and all alternatives include groundwater monitoring that would evaluate the long-term effectiveness of each alternative.

4.2.2 Permanent Solutions

Cleanup actions are required to use permanent solutions to the maximum extent practicable. A permanent solution is defined in MTCA as a cleanup action in which cleanup standards can be met without further action being required.

Alternatives 2 and 3 are permanent solutions in that contaminants in soil and groundwater are either treated or removed. Alternative 1 is not permanent because contaminated soil would not be removed and the time frame for natural attenuation of soil would be on the order of decades.

Formal procedures for determining whether a proposed cleanup action is permanent to the maximum extent practicable are provided in MTCA and are based on a disproportionate cost analysis in which alternatives are compared using a number of evaluation criteria. However, per WAC 173-340-360 (3)(d), a disproportionate cost analysis is not required if the cleanup action proposed is a permanent solution as agreed to by Ecology. A disproportionate cost analysis was not performed in the RI/FS (Parametrix 2009) because the selected alternative was a permanent solution.

4.2.3 Reasonable Restoration Time Frame

This section determines if each petroleum-contaminated soil and groundwater alternative provides for a reasonable restoration time frame. Factors to be considered when determining whether a cleanup action provides for a reasonable restoration time frame and a discussion regarding each petroleum-contaminated soil and groundwater alternative follow:

- Potential risk posed by the Site to human health and the environment—Currently, site risks are limited; thus, some flexibility in cleanup time frame is warranted.
- Practicability of achieving a shorter restoration time frame—The cleanup time frame varies from several years for Alternative 3, slightly longer for Alternative 2, and up to decades for Alternative 1.
- Current and future use of the Site, surrounding area, and associated resources that are or may be affected by releases from the Site—Future Site uses would not be substantially different than current usage in this context.
- Availability of alternative water supply—Municipal drinking water is available to the Site.
- Likely effectiveness and reliability of institutional controls—Institutional controls to limit or prevent exposure to contaminated soil and groundwater are likely to be effective and reliable.
- Ability to control and monitor migration of hazardous substances—Ability to monitor migration is high for all alternatives through groundwater monitoring.
- Toxicity of hazardous substances—Although the toxicity of some constituents is high, exposure risks are moderate, allowing for some flexibility in the cleanup time frame.
- Natural processes and reduced concentrations of hazardous substances—The natural degradation of petroleum hydrocarbons has been documented at numerous other sites.

Based on consideration of all the sub-criteria associated with the evaluation of the reasonable restoration time frame, as well as the various scenarios associated with the Site, Alternatives 2 and 3 provide restoration within a reasonable time frame.

4.2.4 Additional Performance Criteria

In addition to meeting the above minimum requirements, MTCA provides direction regarding the requirements of alternatives on a number of other performance criteria as follows:

- All the alternatives would require institutional controls to limit or prevent exposure to contaminated soil and/or groundwater
- All three alternatives prevent or minimize the migration of hazardous substances through the use of caps, removal, destruction, containment, and monitoring.
- None of the alternatives rely on the use of dilution or dispersion to achieve cleanup levels or eliminate exposure pathways.
- Remediation levels are not included as part of the implementation of the alternatives.

4.3 DETAILED EVALUATION OF ALTERNATIVES

The three alternatives were compared based on effectiveness, implementability, public concern, and cost in the RI/FS (Parametrix 2009). Table 4-1 summarizes the comparison of the alternatives. Effectiveness was evaluated in terms of protectiveness and ability to achieve the RAOs. The implementability of the alternatives depends on their technical feasibility, the availability of required resources, and administrative feasibility. Public concern reflects the anticipated level of adverse public reaction to each alternative. Costs were developed based on Engineer's estimates and experience from past similar projects.

5. PROPOSED CLEANUP ACTION

Excavation and removal of contaminated soil (Alternative 3) is the proposed cleanup action for the Site. The proposed cleanup action includes excavating approximately 3,370 cy or 4,550 tons of contaminated soil with heavy equipment. Figure 5-1 shows the footprint of the area of excavation. This volume assumes that contaminated soils exist between the depths of 3 and 10 feet bgs within the contaminated soil footprint. Soils between the depths of 0 and 3 feet bgs are assumed to be clean (1,450 cy). Clean and contaminated soil would be segregated based on field screening and stockpiled separately for confirmation testing. Soil that is confirmed to be contaminated would be trucked to a permitted landfill. A possible candidate landfill is the Roosevelt Regional Landfill in Klickitat County. Confirmation soil samples would be collected from the sidewalls and bottom of the excavation. It is estimated that a total of 25 excavation and stockpile samples would be collected and tested. Once the excavation is confirmed to be clean, it would be backfilled with a combination of clean stockpiled soil and imported structural fill.

Excavation to a depth of 10 feet bgs will require excavation dewatering. The average depth of groundwater is approximately 6 feet bgs. Dewatering water would be treated to remove sediments and contaminants to meet treatment standards before being discharged to the sanitary sewer.

Residual groundwater contamination will be treated using ORC™ that is applied in slurry form with the soils used to backfill the excavation at a dosing rate of 1.5 pounds per cubic yard. ORC™ would only be applied to soils below the anticipated seasonal high groundwater elevation.

Groundwater monitoring would be conducted quarterly for 1 year after the cleanup to assess groundwater conditions and verify that the contaminated groundwater plume is not expanding. It is anticipated that removal of the contaminant source (the contaminated soil) and ORC™ application would result in a shrinking plume that would ultimately disappear. This alternative includes the implementation of institutional controls on the affected properties in case soil cleanup levels are not met and to control groundwater exposure risk. Two new monitoring wells and two existing wells will be used for monitoring (Figure 5-1).

Following the soil removal, residual soil and groundwater concentrations may remain that present a potential risk for vapor intrusion. A vapor intrusion evaluation would be conducted for any occupied building constructed within 100 feet of the contaminated soil footprint or groundwater plume. If warranted, vapor intrusion mitigation measures will be designed into the new building(s).

This alternative is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate, complies with cleanup standards, meets the threshold criteria, provides a high likelihood of achieving the RAOs within a reasonable restoration time frame, and meets the additional performance criteria. Furthermore, the risks discussed in Section 2.2.4 are mitigated under the proposed cleanup action because the action either removes the contaminants to levels that are protective to receptors or places engineering and administrative controls to prevent exposure.

It is recommended that the groundwater samples collected be analyzed for HVOCs during each of the four quarterly monitoring events to provide an ongoing assessment of concentration trends. This data would aid potential future planning efforts regarding cleanup of the upgradient HVOCs sources. In addition to monitoring for HVOCs, any future Site development activities should include the proper management and disposal of contaminated groundwater generated by construction activities. If necessary, institutional controls (discussed below) should be implemented that will ensure that humans and the environment are not exposed to HVOCs in groundwater.

5.1 INSTITUTIONAL CONTROLS AND FINANCIAL ASSURANCES

WAC 173-340-360(2)(e) requires cleanup actions to use institutional controls and financial assurances where required under WAC 173-340-440. Institutional controls are actions taken to limit or prohibit activities that may interfere with the integrity of an interim or cleanup action or that may result in exposure of hazardous substances at a site. They are required to ensure the continued protection of human health and the environment and the integrity of an interim action.

The required institutional controls for the proposed cleanup action may include:

- Restrictive covenants that might apply to the use of the land or resources including use of groundwater in the area and digging to a depth where contaminated groundwater is encountered;
- Maintenance (e.g., monitoring wells will have to be periodically inspected and repaired when needed);
- Financial assurances (The City may be required to show that they have enough funds to cover all costs associated with the cleanup, including design, construction, monitoring, and any institutional controls); and
- Placement of notices in local zoning or building department records or state lands records, including the use of zoning maps describing land use restrictions.

Specific institutional controls will be determined for the Site during remedial design of the proposed cleanup action.

It is anticipated that institutional controls will be necessary at the Site because the proposed cleanup actions will leave HVOCs (and possibly petroleum constituents) in groundwater at concentrations above Site cleanup levels.

6. SCHEDULE

The proposed cleanup action is planned to be completed during construction of the realignment of SR 522. The realignment of SR 522 is anticipated to begin during the second quarter of 2010. The removal and disposal of contaminated soil and backfill of the excavated area will be completed within approximately 30 days of the start of construction of the SR 522 realignment in the area.

Groundwater monitoring in the area of the excavation will be conducted for 1 year after the completion of the SR 522 realignment to verify the source of groundwater contamination has been removed and cleanup levels for Site contamination have been met.

7. REFERENCES

AFCEE (Air Force Center for Environmental Excellence). 2004. Principles and Practices of Enhanced Anaerobic Bioremediation of Chlorinated Solvents. August 2004.

Ecology (Washington State Department of Ecology). 2007. Model Toxics Control Act Cleanup Regulations. Washington Administrative Code (WAC) 173-340. November 2007.

ECOSS (Environmental Coalition of South Seattle). 2008. City of Bothell Revenue Development Area, Report on Tax Parcel History through 1972. Prepared for King County Solid Waste Division. January 2008.

HWA. 2007. Phase II Environmental Site Assessment, Beta Bothell Landing Property, Parcels No. 9457200015 & 9457200020, Bothell, Washington. Prepared for City of Bothell. November 1, 2007.

HWA. 2008. Phase II Environmental Site Assessment, Hertz Rentals Property, Bothell Washington. Prepared for City of Bothell. October 10, 2008.

Riley Group. 2007. Draft Phase I Environmental Site Assessment, Bothell Landing Property #1. May 29, 2007.

Parametrix. 2009. Bothell Landing Remedial Investigation/Feasibility Study Revision No. 0. Prepared by Parametrix, Bellevue, Washington. November 2009.

FIGURES

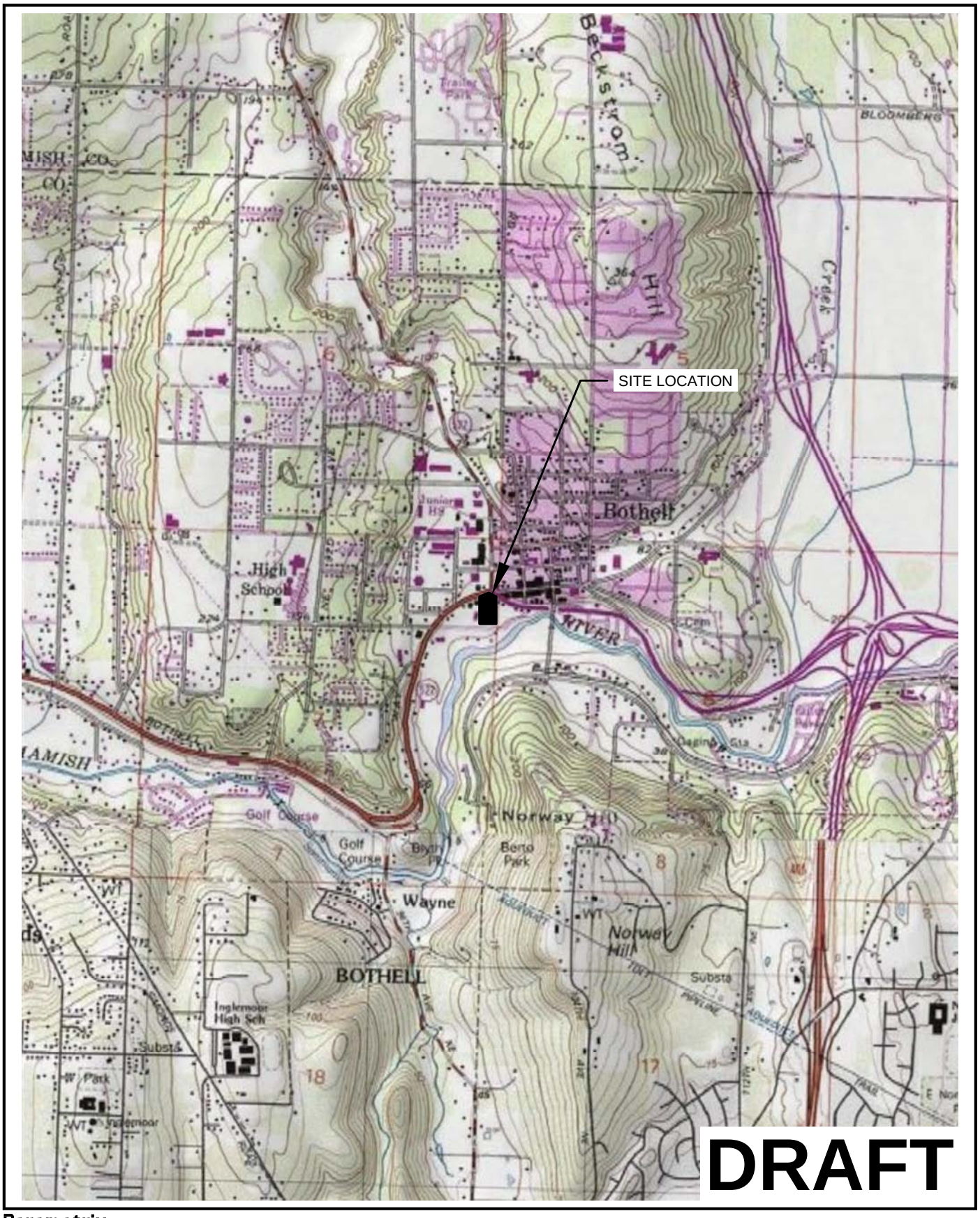

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Image Source: USGS Bothell Quadrangle 1981

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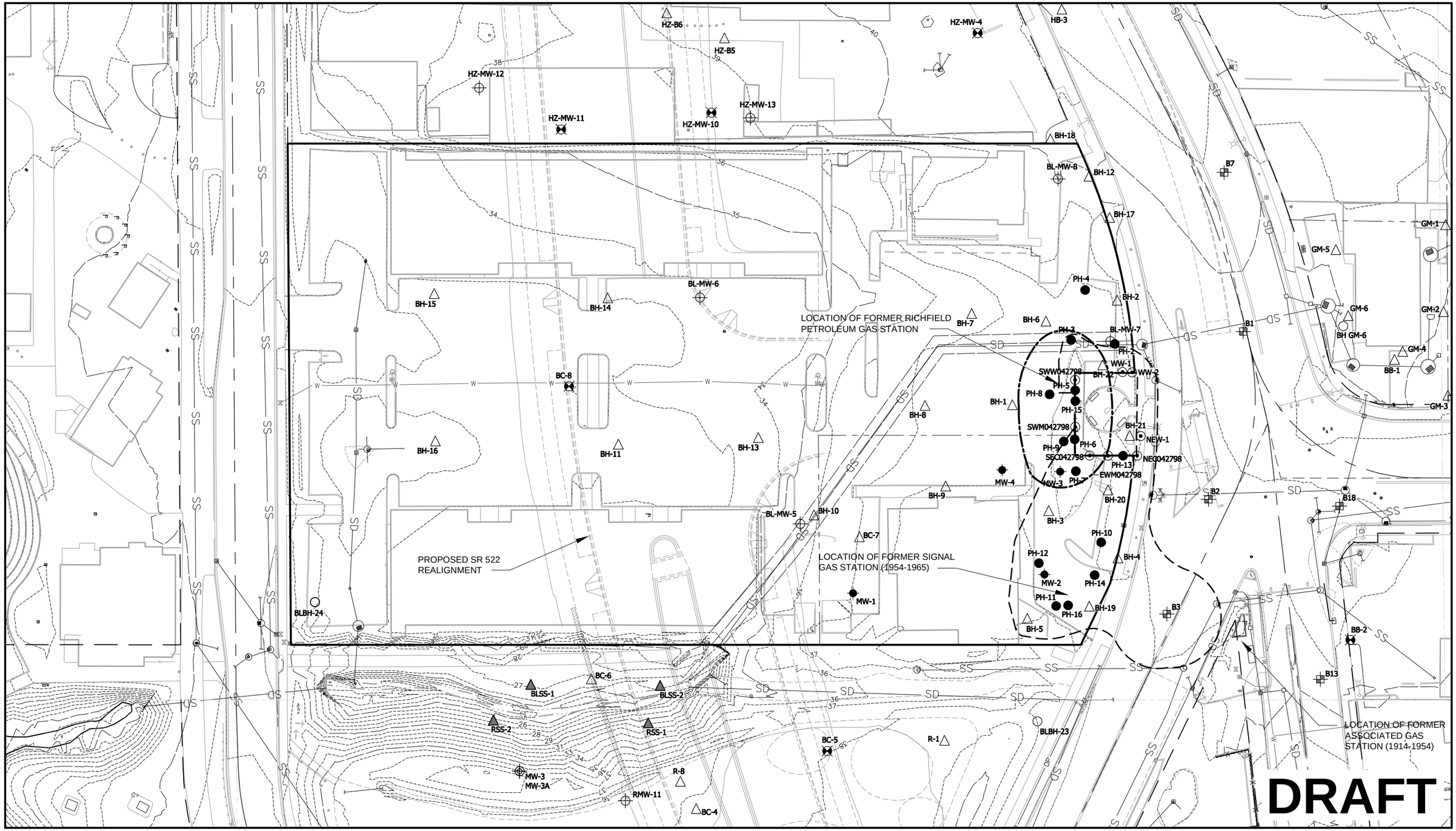
SCALE IN FEET

Figure 1-1
City of Bothell
Bothell Landing Site
Site Vicinity



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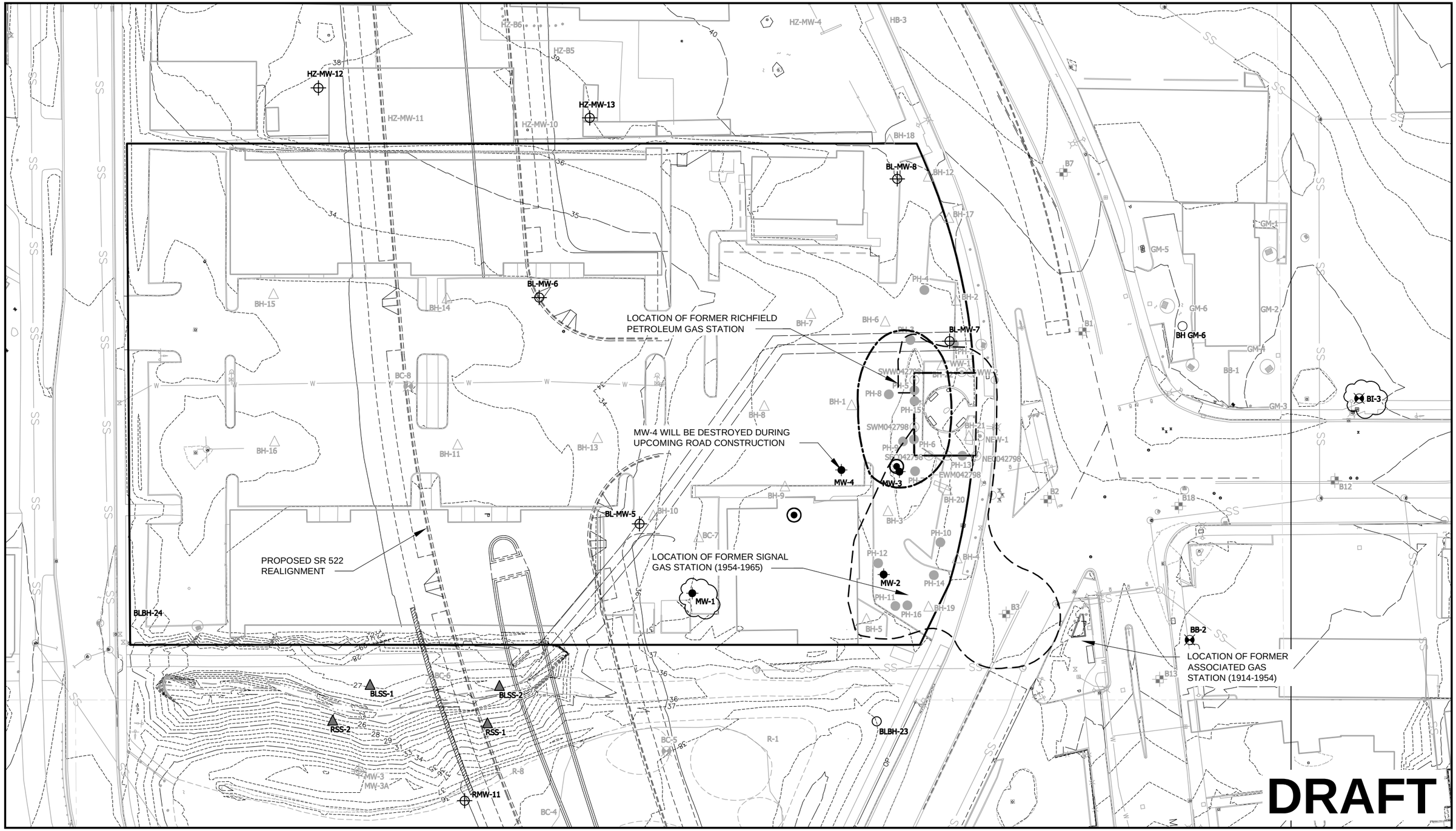
- KLEINFELDER 1999 BORING LOCATIONS
- KLEINFELDER 1999 WELL LOCATIONS
- HWA 2007 PHASE II ESA BORINGS
- HWA 2007 WELL LOCATIONS
- PMX 2009 RI/FS BORING LOCATIONS
- PMX 2009 RI/FS WELL LOCATIONS
- PMX 2009 RI/FS SURFACE SOIL LOCATIONS
- CDM 2009 ROW BORING LOCATIONS
- GTI 1992 FORMER WELL LOCATIONS
- SITE BOUNDARY
- EXISTING BUILDING
- APPROX LIMITS OF PETROLEUM IMPACTED SOILS
- APPROX LIMITS OF PETROLEUM IMPACTED GROUNDWATER

Figure 2-1
City of Bothell
Bothell Landing Site
Site Plan



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- HWA 2007 PHASE II ESA BORINGS
- HWA 2007 PHASE II ESA WELL LOCATIONS
- PMX 2009 RI/FS BORING LOCATIONS
- PMX 2009 RI/FS WELL LOCATIONS
- PMX 2009 RI/FS SURFACE SOIL LOCATIONS
- CDM 2009 ROW BORING LOCATIONS
- GTI 1992 FORMER WELL LOCATIONS
- PROPOSED NEW MONITORING WELL
- EXISTING MONITORING WELL TO BE USED FOR LONG TERM MONITORING
- SITE BOUNDARY
- FOOTPRINT OF PETROLEUM CONTAMINATED SOIL TO BE ADDRESSED UNDER PROPOSED CLEAN UP ACTION
- PETROLEUM - IMPACTED GROUNDWATER PLUME TO BE ADDRESSED UNDER PROPOSED CLEAN UP ACTION

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Figure 5-1
City of Bothell
Bothell Landing Site
Proposed Cleanup Action

TABLES

Table 3-1. Specific Applicable or Relevant and Appropriate Requirements (ARARs)

ARAR	Applicability
Soil	
Model Toxics Control Act (WAC 173-340-740, -747)	MTCA cleanup levels are applicable to Site soil.
Groundwater	
Model Toxics Control Act (WAC 173-340-720)	MTCA cleanup levels are applicable to Site groundwater.
Surface Water	
Model Toxics Control Act (WAC 173-340-730)	MTCA cleanup levels are applicable to the Site if remedial activities cause a release to surface water.
Air	
Washington Clean Air Act and Implementing Regulations (WAC 173-400; WAC 173-460; WAC 173-490)	Applicable for excavation activities.
Model Toxics Control Act (WAC 173-340-750)	MTCA cleanup levels are applicable to the Site if remedial activities cause a release to air.
Miscellaneous	
Protection of Wetlands, Executive Order 11990 (40 CFR Part 6, Appendix A)	This Act would be potentially applicable to remedial activities at the Site.
Native American Graves Protection and Repatriation Act (43 CFR Part 10)	This Act is applicable to remedial actions at the Site because it is possible that the disturbance of Native American materials could occur as a result of work in subsurface excavations at the Site. Such materials are not known to be present at the Site, but could be inadvertently uncovered during soil removal.
National Historic Preservation Act (36 CFR Parts 60, 63, and 800)	This Act is applicable to subsurface work at the Site. No such sites are known to be present in the area.
Washington Hazardous Waste Management Act (WAC 173-303)	This regulation is applicable to handling of contaminated media at the Site. The area of contamination policy allows contaminated media to be consolidated within the same area of a site without triggering Resource Conservation and Recovery Act or Washington dangerous waste regulations.
Department of Transportation of Hazardous Wastes (49 CFR 105 – 180)	Applicable to remedial activities that involve the off-site transportation of hazardous waste.
Washington Solid Waste Handling Standards (WAC 173-350)	These regulations are applicable to solid nonhazardous wastes and are relevant and appropriate to on-site remedial actions governing contaminated media management.
Washington Water Well Construction Act Regulations (WAC 173-160)	These regulations are applicable to the installation, operation, or closure of monitoring and treatment wells at the Site.

Table 3-2. Cleanup levels

	Medium of Concern			
	Soil			Groundwater
Hazardous Substance	**MTCA A (mg/kg)**	**Ecological Indicator Concentration (mg/kg)**	**Background Concentration (mg/kg)**	**MTCA A (mg/L)**
Benzene	0.030	Not Available	None	0.005
Diesel	2,000	200	None	0.5
Motor Oil	2,000	Not Available	None	0.5
Gasoline	30/100[1.]	100	None	0.8/1[2]
Barium	Not Available	102	Not Available	N/A
Lead	250	50	N/A	N/A
1-Methylnaphthalene	5	Not Available	None	Not Available
2-Methylnaphthalene	5	Not Available	None	Not Available

[1]100 of no benzene and TEX < 1% gas; 30 for other mixtures

[2]1 if no benzene; 0.8 if benzene

N/A – Not Applicable

Table 4-1. Detailed Alternatives Analysis

Alternative	Description	Effectiveness	Implementability	Public Concern	Estimated Cost
1. Monitored Natural Attenuation	Leave contamination in place. Monitor groundwater biannually for a minimum of 10 years.	Low	High	High	$214,798
2. In Situ Chemical Oxidation	Treat contamination in situ using soil mixing, chemical oxidation, and application of ORC™. Monitor groundwater quarterly for 1 year.	Medium	Medium	Low	$1,027,296
3. Excavation and Off-Site Removal	Excavate and remove contaminated soils. Treat groundwater with application of ORC™ in backfill. Monitor groundwater quarterly for 1 year.	High	High	Low	$888,489

APPENDIX A

Bothell Downtown Subarea Plan (Figure 1.1)

C. The Envisioned Future Downtown

This section provides an overview of the desired physical outcomes intended to result from implementing the combined regulations and planned public actions contained in this Plan.

The Downtown Subarea is composed of a multitude of privately held properties and miles of public rights-of-way under public ownership. The overarching purpose of the Downtown Plan is to orchestrate investment in changes made to this multiplicity of properties to produce greater value than any separate development could achieve, by providing a common purpose that all investors can rely upon, contribute to, and derive value from. This section describes the common purpose to which all investments shall be directed: a vision of the future that is sufficiently specific to provide a common purpose, yet broad enough to respond to opportunities and to the changes in the marketplace that will inevitably arise.

Note: The specific outcomes described and illustrated in this section are not part of the formal regulating code, and new development proposals will not be required to mimic the specific designs presented in the illustrations.

Fig. 1.1 A vision of potential future development in downtown Bothell showing one scenario focusing on redevelopment in the core area